Mini Review

Implementation of Technological Upgradation in Public Distribution System in India for Ensuring Availability, Accessibility and Affordability

Roli Misra[1], Ankit Upadhyay[1]*

[1]Department of Economics, University of Lucknow, India.

Article Information

*Corresponding author
Ankit Upadhyay,
Department of Economics, University of Lucknow, India.
Email: upadhyay.ankit2753@gmail.com

Abstract

The largest initiative to reduce poverty in India is the public distribution system (PDS), which uses a network of fair-pricing shops to supply highly subsidised food grains in order to fulfil necessities of households living below poverty line. PDS's primary objective is to buy food grains from farmers. This is to ensure that grain is distributed, stored, and transported so that people in need have access to food. The Indian government has thus upgraded the PDS's technology in an attempt to increase its transparency. To close this gap between technology and citizen benefits, e-government makes use of technical intermediaries like ration Integrated Weight Management System (IWMS), Management Information System (MIS), Inventory management system, etc. The focus of the government is to enact a number of administrative and technological changes under the centralised online real-time electronic public distribution system in order to empower end users of the PDS supply. In this context this paper deals with the number of difficulties when distribution system switches from manual to automated transactions, dealer of fair price shop, who employs the technologies. Based on secondary literature, the objective of this paper is to understand the challenges associated with implementing technology at the point of sale during distribution, as well as study the status of the implementation technological based distribution system.

Introduction

Throughout India's entire history of British colonial administration, famines served as the impetus for the Public Distribution System (PDS). The first was the 1770 Bengal famine which claimed the lives of an estimated 10 million people. That was the result of mistakes made between 1860 and 1910 by the colonists of the East India Company. The other famine was again the Bengal famine of 1943 which was the worst famine to hit at the end of British rule in India. During that period, the state leadership understood the requirement of food security for the poor population, and hence, a gradual decontrol in the food grain sector was established (GOI, 1976). Also, the food grains policy committee was established in 1947. In 1950 food procurement committee submitted their report and

advocated for monopolies, food procurement, the development of the free market, the application of full statutory rating in towns with a population of 50,000 or more. The Food Corporation of India and the Agriculture Price Commission both were established by the Indian government in January 1965 via an act of Parliament. Since then, the primary objective of the Indian government's food security strategy has been to guarantee that food is adequately available to everyone at a reasonable cost (GOI, 1976).

The Public Distribution System (PDS) is an important tool for ensuring food grains' accessibility, availability, and affordability for the India's most deprived and weaker section of the society. In the 1990s significant modifications were made to the PDS system due to which distribution system came under criticism from two main segments: Public distribution revealed an urban bias that mostly kept rural vulnerable population out of the system (Howes and Jha, 1992). The primary objective of expanding the PDS to include the entire population of the country rural and urban and the Revamped Public Distribution System (RPDS) was launched by the government in June 1992. Due to this revised approach, those populations living in the most challenged areas of the country were targeted by the PDS to ensure food security. This encompassed regions like drought-prone areas, desert areas, tribal areas, and specific places defined as urban slums. Items included tea, pulses, and iodide salt that were made available through the RPDS programme. Due to certain shortcoming in RPDS, like proliferation of bogus ration card, poor storage facilities, failure in identifying eligible beneficiaries, etc. government decided to introduce the Targeted Public Distribution System (TPDS) in June 1997, committed to distributing 10 kg of food per month to each BPL family. When the new TPDS was implemented across the country, it represented a revised reasoning that included two significant structural changes:

First, the public distribution system provides considerable flexibility to governments to maintain subsidised food grain for the APL, as well as the programme moved from universal supply to channels of subsidy distribution restricted to the BPL families. A highly subsidised food grain was provided to the most impoverished families and individuals, categorised under *Antyodaya Anna Yojana (AAY)* programme. Eligibility of APL and BPL beneficiaries was periodically reviewed based on the income-based poverty line.

Second, States received commodities from the universal PDS according to theoretical requirements. Under the targeted approach, the supply of grains was distributed proportionately based on the central government's unique estimations of poverty incidence for each state. This marks the beginning of the allocation of commodities based on relative state poverty (Tritah, 2003).

In the series of developments in food security programme, The National Food Security Act of 2013 (NFSA) was passed by India's parliament, which would guarantee of food accessibility as a right to the population. The objective of zero poverty in India will be achieved through efforts to prevent food leakage, reduce wastage of grains and provide food at affordable rates to the needy population.

Table 1: Major events in the series of evolution of Public Distribution System in India

Year	Event
1770	Severe famine in Bengal
1770-1858	Frequent famine in Bengal
1896-97	Large scale famine affecting large parts of India
1901-43	Few famines
1943	Bengal famine
1947	First food grain committee establish after independence
1965	Establishment of Food Corporation of India
1991	Introduction of Revamp Public distribution System
1997	Introduction of TPDS
2013	National Food Security Act

Source: Structured from Drèze (1990).

Systematic leakages are one of the main problems with this public welfare program, and the main thing, preventing it from operating normally (Gulati & Saini, 2015). Ration shops have seen a decline in the number of cardholders due to targeting, even if many governments have implemented strategies for enforcing accountability over time. As a result, these fair-price shops desperately needed other resources to sustain their ration shops. Ration shops have seen a decline in their customer base due to targeting, even if many governments have implemented varying strategies for enforcing accountability over time. As a result, these businesses are desperately in need of fresh resources to stay in business. According to Khera (2011), one of the PDS's primary issues is that "corruption has become a requirement of economic survival for the PDS dealers," which raises a question mark on the capabilities of PDS to effectively meet the needs of its beneficiaries.

The Unique Identification Authority of India (UIDAI) was established by the Indian government in January 2009, with the goal of collecting biometric data from all citizens,

keeping it in a central database, and providing each enrolled person with a 12-digit unique identification number (*https://uidai.gov.in/en/about-uidai/unique-identification-authority-of-india.html#:~:text=About%20UIDAI,-The%20Unique%20Identification&text=The%20UID%20had%2 0to%20be,to%20the%20residents%20of%20India*). In June 2009, an office of the central government planning commission was set up under UIDAI and Nandan Nilekani was appointed the first head of this office, who is the co-founder of Infosys which is an important technology service company. Aadhar enrolment centres were established nationwide beginning in 2010, and state governments launched aggressive campaigns to improve the program's adherence by the citizens. The programme, which was initially launched by the previous government, has been continued and has encouraged its inclusion in the social protection system, indeed to assist the poor population of India (Bhatia and Bhabha, 2017).

Complex infrastructure results in system failures reported across several states and areas, raising questions about the efficacy of Aadhar-based PDS (Dreze and Khera, 2017). There is a possibility that malfunctions lead to exacerbate exclusion mistakes. This has been found to be the primary issue that the PDS conversion to a targeted system has brought about (Swaminathan, 2008). The "exclusion errors" describe issues that result in legitimately needy families being shut out of programmes because their status was incorrectly classified or because the distribution system is inefficient (Tritah, 2003). If cardholders are not recognised by biometric PDS machines, the exclusion is the primary reason for access to ration (Masiero and Prakash 2015; Drèze and Khera 2017).

Integration of Aadhar in Public Distribution System

Adoption of this system shows the government intends to restrict leakages in the PDS system (Government of India), by incorporating Aadhar as a crucial component of part of Indian social security policy. As on 29th September 2023, Unique Identification Authority of India has generated 138.08 crore Aadhar numbers to the residents of India (https://uidai.gov.in/). Aadhar is the world's largest biometric database and is directly connected to the delivery of social benefits schemes and government services.

It is in place to mention that before the implementation of the Aadhar-based distribution system, there were many loopholes in the distribution system with the primary loophole being that false ration card numbers were typically used to justify fake transactions. This allowed the ration dealers to sell in private markets and make illegal gains while claiming to have sold to eligible customers at PDS prices. However, since biometrics are being used in PDS to verify the identity of registered beneficiaries, it more difficult to use fake ration cards, due to which the chances

of ration vendors manipulating the system have been reduced.

Aadhar-based PDS system targets genuine beneficiaries as well and it reduces the leakages. Though, the incentives of FPS dealers gets reduced and restricted from illicit trading, but overall, this Aadhar-based distribution helps to ensure that, without biometric identification entitled beneficiaries, Kotedar never shows fake lifting of ration from their fair price shop. The method behind that is based on how a biometric identification system addresses the issue of fake transaction records (Masiero 2020; Masiero et al., 2015).

Secondly, as the lifting of food grains from ration shops is monitored by using Aadhar biometric verification of entitled beneficiaries, constraints on leakage are reinforced. In addition to verifying the identification of genuine card holders, point-of-sale biometric machines record the quantity of food grains sold during each transaction. This way, the distribution of ration from fair price shops is recorded in a specific database, thus restricting the ability of dealers to fabricate transactions that have not happened.

In addition, the system checks on stocks of ration shops, so that it is difficult to claim by the Kotedar, that they are running out of stocks of grains and redirect ration to the open market because this mechanism, verifies quantities of offtake and allocated ration received by shops after every month. Aadhar-based distribution mechanism disallowed bogus ration cards because Kotedar is unable to apply for extra ration for next month. After all, FCI delivers only an exhausted quantity of ration to the fair price shops.

In the previous PDS system, households had access to only a specific ration shop through which they could only purchase ration. Beneficiaries are therefore unable to choose to buy from another ration shop, even if they know that their FPS shop dealer misconduct in the distribution of ration, which is typically manifested by low weighing or pretending to be out of stock of ration.

One Nation One Ration Card (ONORCs)

On August 1, 2019, the One Nation One Ration Card Scheme (ONORC) was introduced. Initially, it offered inter-state ration card portability only in four states of India, as follows: Telangana, Andhra Pradesh, Maharashtra, and Gujarat. But, as of June 2022, the ONORC scheme was effective across the nation, including Assam. The principal objective of ONORCs is to provide migrant workers and their families with nationwide ration portability from the public distribution system (PDS) at any fair pricing store across the nation. In the present Aadhar based system of ration distribution, biometric machine easily identifies genuine ration beneficiaries registered with the system, hence allowing portability to the card holders. Even these ration card holders may avail their entitlements from another village, or district, this national portability has not

been very effective due to shortcomings in the delivery system at the point of sale. It is also known that households seeking ration under ONORC, from the FPS shops of any other state were not given ration until he had given ration to all of the holders of his allotted ration cards. As a result, many times they are unable to receive benefits ONORC (Vamakshi, 2022).

Status of Technological Upgradation in PDS

Cash transfer instead of food distribution system would challenge the existing governance structure, where beneficiaries would able to buy their food over taking over from open market. Although the goal of eliminating leakages and distortion justifies the change, observers noted that it increases the chance of exclusion errors, thereby jeopardising the improved effectiveness brought about by reforms (Drèze and Khera, 2017; Chanchani, 2017). In her study, Khera (2018) suggested a method of distribution other than Aadhar-based ration distribution, for monitoring PDS leakages. Smart cards with an integrated memory chip facilitated the transactions, which meant that when beneficiaries avail their ration it would be recorded on the chip and directly sent to the main server. Maintaining user privacy is essential to developing a transparent and secure system that allows beneficiaries to address other social securities, which were provided by the government. Furthermore, methods for differentiating the user's identity distribution between the system and distributor must be developed and follows these given criteria:

Integrated Weight Management System (IWMS)

Food grain loaded trucks are weighed and this weigh data are automatically sent to the main server without human interference. An SMS warning is issued to the relevant authority and a theft report is created if the weight of the grain deliver differ from the weight of grain dispatched.

Management Information System (MIS)

MIS is a system which computerise keeping records of every transaction under PDS related to stocks in godowns, transportation of grain, FPS shops, etc. It gathers data relating to daily transactions under PDS and making a separate report, like orders, sales, financial operations etc.

Inventory Management

In this Inventory management system, stock of grains has been notified. What quantity of grain must be maintained in reserve to guarantee a steady supply. Real time changes in inventory stocks are available through an online portal.

GPS-Based Fleet Tracking

GPS enabled grain transporting trucks transmitted their real time location related information to concerned officials through automated SMS system. A truck carrying grains from the FCI to the state food corporation godowns deviate from the prearranged path.

Sale to Beneficiary

At delivery point of sale terminals are used at FPS shops to records sales transaction. A barcode scanner is used to scan the coupons that the beneficiaries bring, and the data is then sent straight to the main MIS computer so that sales reports can be produced.

Citizen Interface

On the PDS portal, beneficiaries can sign up to receive several SMS alerts. All ward or panchayat level vigilance committee members receive an SMS from the system automatically alerting them to the off-take of grain by ward merchants.

Integrated Management of Public Distribution System (IMPDS)

The scheme on end-to-end automation of Aadhar enabled Public Distribution System (AePDS) was initiated by Ministry of Electronic & Information Technology, (GOI) with the objective, to provide transparency to the distribution of subsidised food grains throughout the nation and to modernise the TPDS operations. Before understanding the working structure of AePDS, here are some related terms that should be discussed (Annual Report, 2022-23).

i) State Data Centre (SDC): The Central Repository of the State, secure data storage, Citizen Information/Services Portal, State intranet, remote management, and service integration, are the services provided by the State Data Centre (SDC). Additionally, SDCs would reduce the total cost of Data Management, IT Resource Management, Deployment, and other expenditures while improving Operational and Management Control.

ii) Ration Card Management System (RCMS): The Ration Card Management System (RCMS) was created to administer the NFSA beneficiary database, to make modifications, inclusion, or exclusion of beneficiaries, following the proper procedure of inquiry at the Block/ULB level because the NFSA database is a dynamic database.

iii) State e-Governance Service Delivery Gateway (SSDG): The State Service Delivery Gateway (SSDG) provides smooth data sharing and interoperability between departments by serving as standards-based communications middleware.

iv) Electronic point of sale machine (e-POS): It is Aadhar based point of sale machine, used for the identification of registered beneficiary. This machine is linked with UIDAI portal for the verification of genuine card holder.

Working structure of Ae-PDS: When a ration card holder reaches to nearest FPS shop, to avail their entitlements, the following steps are followed. First, FPS dealer punches ration card enrollment number and biometric details like scanning a finger of beneficiary with the help of e-POS machine for the collection of biometric identification details is done. The biometric data of beneficiaries, is transferred to departmental server of State Data Centre (SDC), which is connected to RCMS data base, managed by National Informatics Centre of India (NIC) for verification of genuine card holder. The biometric details get forwarded to UIDAI data base. In this process, Aadhar card number, biometric details and ration card details get matched accurately, then server of SDC sends a confirmation of matched details. In the next step, e-POS machine display details like, the type of card (PHH or AAY), listed number of beneficiaries in that ration card and quantity of ration that would be entitled to that beneficiary and shown all details are verified. During this process, Integrator system coordinates with other systems like UIADI, RCMS, NIC, SDC, SSDG to complete this process efficiently (Fig. 1).

In order to apply a new ration card, eligible individual/family member applies online through nearest Common Service Centre (CSC). All details like, Aadhar card details of family members, income certificate, resident certificate, and bank passbook, are required for the application of new ration card. In the next step, these details are submitted and forwarded to Ration Card Management System (RCMS) data base by State e-Governance Service Delivery Gateway (SSDG). SSDG firstly, does physical verification of registered data and forwards the Ration Card Management System (RCMS) data base for further verification and for linking Aadhar details through UIDAI portal. During this process, duplicacy of ration card is also being checked. If all details and process have been checked and verified, then new ration card gets issued.

The National Informatics Centre (NIC) has built a grievance redressal cell named Samadhan. The software in this system automatically creates three SMSs to the appropriate department, the sub-division office, and the block development office/gram panchayat as soon as a citizen submits a complaint. Additionally, the complaint receives a provisional date for redress. On a website, the responsible department may view complaints and take the appropriate action to resolve the issue. The district administration have resolved several issues with the provision of public services using this mechanism. It has made it easier for beneficiaries to communicate important information to the government quickly, accurately, and without delay. It has also improved the interaction between the administration and the cardholders.
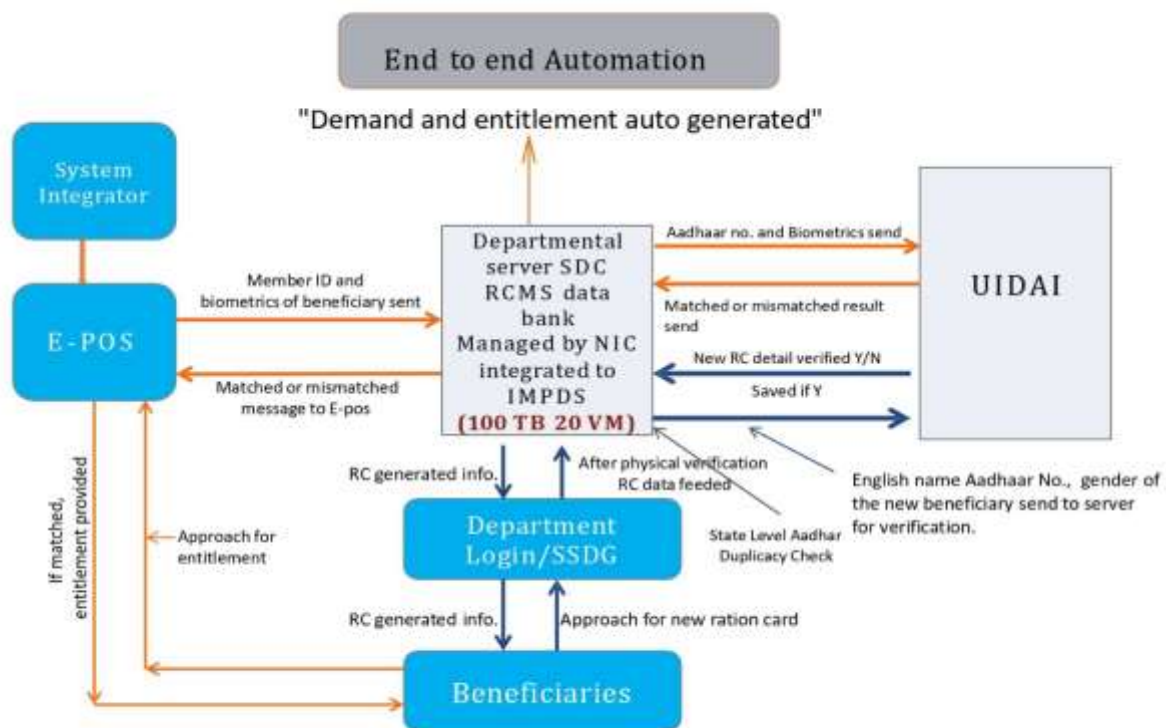

Fig. 1: Working Structure of Ae-PDS

[Source: Department of Food & Public Distribution, Ministry of Consumer Affairs, Food and Public Distribution]

Conclusion

The results of this study suggest that technology plays a vital role in Public Distribution System in India. This study indicates that implementation of technology in the food distribution system assist cardholders as well as FPS dealers and officials of Public Distribution System. Even with all of the aforementioned issues, PDS members are used to working with the state governments for managing this programme. This study identifies that integration of digitalization in the PDS helps to make it more transparent, cost effective, and responsive. This study concluded that the implementation of technology in PDS system, has helped in maintenance of stock of food grains in godown, storage facilities, monitoring transportation of grains via GPS enabled system etc, and there has been and hence there has been overall an overall improvement in the efficacy of PDS system efficacy of PDS system.

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